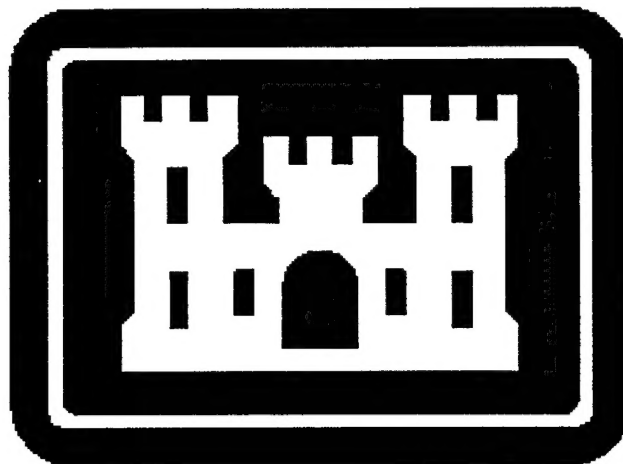


**CORPS OF ENGINEERS**  
**LIMITED ENERGY STUDY**  
**EXTENSION OF GAS SERVICE**  
**TO SATELLITE AREAS**

**CHARLES MELVIN PRICE SUPPORT CENTER**  
**GRANITE CITY, ILLINOIS**

**FINAL SUBMITTAL**

September 20, 1996



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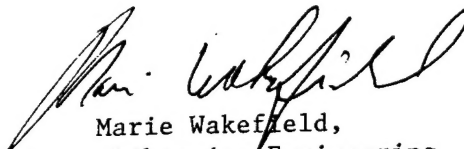


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## **SECTION 1**

### **EXECUTIVE SUMMARY**

## SECTION 1

### EXECUTIVE SUMMARY

#### A. INTRODUCTION

The Scope of Work (See Appendix A) called for the analysis of economic feasibility of conversion of heating systems in eleven (11) separate buildings (or groups of buildings) to heating systems based upon the use of natural gas.

In the Entry Interview, Mr. Joseph Hooten requested conversion to electric heat based heating systems also be included in the analysis and this was agreed to by the A/E.

#### B. BUILDING DATA

BUILDING NUMBER	TYPE	FLOOR AREA (SQ.FT.)
116	Housing	1,960
192/193	Housing	26,566
200	Vehicle Maintenance	4,709
221	Security	5,083
305	Fire Station	6,439
308/340	Warehouse	8,986
346	Warehouse	22,787
402	Facility Engineering	22,596
411/414	Gymnasium	23,241
444	Office/Maintenance	23,255

C. PRESENT ENERGY CONSUMPTION

	TOTAL ANNUAL ENERGY USED		ANNUAL SOURCE ENERGY USAGE	
BUILDING	MILLIONS BTU	BTU/SQ.FT.	MILLIONS BTU	BTU/SQ.FT.
116	88.0	44,876	263.9	134,641
192/193	470.5	17,711	694.3	26,134
200	446.9	94,907	578.1	122,765
221	106.7	20,990	173.1	34,057
305	146.9	22,814	189.3	29,405
308/340	436.0	48,522	1308.2	145,581
346	506.7	22,238	1520.4	66,721
402	1081.4	47,859	1206.9	53,413
411/414	775.8	33,382	981.8	42,243
444	828.8	35,642	924.5	39,757

BUILDING	FUEL TYPE	ANNUAL USAGE	BTU/YEAR MILLIONS	DOLLARS PER YEAR
116	Electricity	25,771 KWHR	88.0	\$1,112
192/193	Electricity	29,937 KWHR	102.2	\$1,260
	Oil	2,656 Gallons	368.3	\$2,071
200	Electricity	16,194 KWHR	55.3	\$751
	Oil	2,824 Gallons	391.6	\$2,202
221	Electricity	9,147 KWHR	31.2	\$389
	Oil	544 Gallons	75.5	\$413
305	Electricity	5,221 KWHR	17.8	\$227
	Oil	931 Gallons	129.1	\$726
308/340	Electricity	265,916 KWHR	907.6	\$11,365
346	Electricity	148,474 KWHR	506.7	\$6,538
402	Electricity	10,317 KWHR	35.2	\$515
	Oil	7,544 Gallons	1046.2	\$5,884
411/414	Electricity	24,837 KWHR	84.8	\$1,361
	Oil	4,983 Gallons	691.1	\$3,886
444	Electricity	7,831 KWHR	26.7	\$344
	Propane	338.3 mcf*	802.1	\$4,308

\* Thousands of Cubic Feet

#### D. ENERGY CONSERVATION ANALYSIS

1. ECO's Investigated: Detailed descriptions of all ECO's investigated are presented in Section 3 on a Building-By-Building basis. The following are brief descriptions of each ECO.

BUILDING	ECO NUMBER	DESCRIPTION
116	116-1	Install gas-fired hot water boiler with fin tube radiation.
	116-2	Install gas-fired hot air furnace complete with ductwork.
192/193	192-1	Install gas-fire steam boiler.
	192-2	Install electric steam boiler.
200	200-1	Replace steam unit heaters with gas-fired unit heaters.
	200-2	Replace steam unit heaters with electric unit heaters.
	200-3	Replace oil-fired boiler with gas-fired boiler.
	200-4	Replace oil-fired boiler with electric boiler.
221	221-1	Install gas-fired steam boiler to replace feed from boiler house.
	221-2	Install electric steam boiler to replace feed from boiler house.
305	305-1	Install gas-fired steam boiler to replace feed from boiler house.
	305-2	Install electric steam boiler to replace feed from boiler house.
308/340	308/340-1	Replace electric unit heaters with gas-fired unit heaters.
346	346-1	Replace electric unit heaters with gas-fired unit heaters.
402	402-1	Replace oil burner with gas burner.
	402-2	Replace oil-fired boiler with electric boiler.
411/414	411-1	Replace oil-fired boiler with gas-fired boiler.
	411-2	Replace oil-fired boiler with electric boiler.
	411-3	Replace steam unit heaters with gas-fired unit heaters.
	411-4	Replace steam unit heaters with electric unit heaters.
444	444-1	Convert propane heaters to natural gas infrared.
	444-2	Replace old propane devices with electric infrared and duct heaters.
	444-3	Replace propane infrared with natural gas unit heaters.
	444-4	Replace propane infrared heaters with electric unit heaters and duct heaters.

2. ECO'S Recommended:

ECO NUMBER	S.I.R.	SIMPLE PAYBACK (YEARS)
200-1	1.66	19.1
346-1	3.42	16.3
402-1	2.33	15.1
411-1	1.06	32.2
444-1	1.01	31.9

3. ECO'S Rejected:

ECO NUMBER	S.I.R.	SIMPLE PAYBACK (YEARS)
116-1	0.40	47.4
116-2	0.21	91.4
116-3	-0.22	Never
192/193-1	0.29	67.0
192/193-2	-0.02	Never
200-2	-0.46	Never
200-3	0.95	36.9
200-4	-1.13	Never
221-1	0.12	155.7
221-2	-0.03	Never
305-1	0.17	112.7
305-2	-0.24	Never
308/340-1	0.64	38.3
402.2	-1.03	Never
411-2	-0.89	Never
411-3	0.92	36.7
411-4	-0.60	Never
444-2	-1.24	Never
444-3	-0.25	Never
444-4	-4.35	Never

4. ECIP Projects Developed: None.

5. Non-ECIP Project Developed:

If all recommended ECO's are combined into a single project, the package becomes large enough to qualify as an MCA Program Project. Under this scenario relevant data is as follows:

Cost:	\$298,390
Annual Energy Savings:	-18,204 MBTU
Energy Type Saved:	Fossil Fuel/ Electricity
Annual Cost Savings:	\$13,656
S.I.R.	1.94
Simple Payback Period:	21.9 Years
Analysis Date:	December 5, 1996

Section 4 derives a sub-package from this package based upon alternative conditions.

6. Operational or Policy Change Recommendations: None.

#### E. ENERGY AND COST SAVINGS

Total Annual Energy Savings:	-18,204 MBTU
Total Annual Cost Savings:	\$13,656
Percentage of Energy Conserved:	-0.40%
Energy Used Before Implementation:	4547 Million BTU/Yr.
Energy Cost Before Implementation:	\$37,155
Energy Used After Implementation:	4565 Million BTU/Yr.
Energy Cost After Implementation:	\$23,499

It will be noted that energy use actually increases slightly. The implemented ECO's, while actually using more energy, use a lower cost fuel than currently being used and therefore results in lower operating costs.